Sectoral Task Force Report

AGRICULTURE AND FOOD

Ontario Round Table on Environment and Economy

Table ronde de l'Ontario sur l'environnement et l'économie

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Ontario Round Table on Environment and Economy

Table ronde de l'Ontario sur l'environnement et l'économie

The Honourable Ruth Grier
Chair
Ontario Round Table on
Environment and Economy
790 Bay Street, Suite 1003
Toronto, Ontario
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Dear Minister:

The Agriculture and Food Task Force is pleased to submit its report.

Over the past year, the Task Force has consulted as widely as possible with a variety of interest groups. The responses we have received have been most valuable in focusing on the key issues for achieving greater sustainability in the sector.

The members of the Task Force appreciate having had the opportunity to make a contribution to the important work of the Ontario Round Table on Environment and Economy and wish you every success as you deliver your final report.

Respectfully submitted,

Fiona Nelson, Chair

Louis Bruyere

John Girt

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TABLE OF CONTENTS

Preface i

1. Agricultural Change, Agricultural Success 1

2. The Challenges of Recent Decades 5

3. Sustainable Agriculture in Ontario 8

(a) Sustainable Farming 12

Recommendations 1-13 18

(b) The Land 22

Recommendations 14-18 25

(c) Information, Marketing, Processing & Packaging 28

Recommendations 19-30 28

(d) Rural Development 32

Recommendations 31-35 35

(e) Climate Change 36

Recommendations 36-38 40

PREFACE

This report is one in a series prepared for the Ontario Round Table on Environment and Economy. The Round Table was established in 1988 by the Government of Ontario to create a sustainable development strategy for the province. The Honourable Ruth Grier, Minister of the Environment, is its Chair.

To assist in the creation of a sustainable development strategy, the Round Table established six task forces responsible for the Agriculture and Food, Energy and Minerals, Forestry, Manufacturing, Transportation, and Urban Development and Commerce sectors. It also set up a Native People's Circle to provide the Aboriginal perspective on sustainable development.

The sectoral task forces were charged with reporting to the Round Table on how best to begin to achieve sustainability in each sector within the context of the six principles set out by the Round Table in its **Challenge Paper**. These are:

- anticipation and prevention of environmental problems;
- the use of full cost accounting;
- informed decision-making which reflects environmental impacts and long-term goals;
- living off the interest and reserving our "natural capital";
- quality over quantity; and
- respect for nature and the rights of future generations.

The Round Table also asked the task forces to consult with stakeholders in developing their overall strategy for sustainable development. Through a combination of research and formal and informal meetings with stakeholders, the task forces and the Native Circle have documented the state of each sector and the options and obstacles to sustainability, as well as their recommendations for action.

The sectoral task force reports will be forwarded to the Ontario Round Table on Environment and Economy. The final recommendations will be considered by the Round Table as it prepares a Provincial strategy for sustainable development.

The members of the Task Force are:

Chair: **Fiona Nelson**, Trustee, Toronto Board of Education

Members: **John Girt**, President, John Girt & Associates
Gracia Janes, President, Preservation of Agricultural Land Society (PALS)
Ken Knox, Assistant Deputy Minister, Agriculture & Rural Services Division, Ministry of Agriculture & Food
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COMMON SENSE AND COMMON GROUND: AGRICULTURE AND FOOD IN ONTARIO

1. AGRICULTURAL CHANGE, AGRICULTURAL SUCCESS

One of the strengths of the individuals who make up Ontario's agriculture and food system has been their continuing ability to change - to meet new challenges and to grasp opportunities as they have arisen. Part of what makes this ability to change noteworthy is that these individuals have at the same time continued to fulfil their primary responsibility - to feed Ontario's 10,000,000 citizens, along with many others around the world.

At the heart of this system, and standing foremost in the public mind, are the men and women who work Ontario's 70,000 farms - who have, down through the generations, willingly adopted new crops, technologies and practices, as they are proven in the lab and in the field. Less visible, but no less important, are the hundreds of thousands whose work ensures that Ontario's "food chain" continues to stretch, "from farm-gate to dinner-plate". In fact, two in ten Ontarians work within the Agriculture and Food system:

- in food processing and packaging;
- in the wholesale and retail sector;
- in scientific research;
- in health, safety and nutrition;
- in farm supplies;
- in banking, business and economic services;
- in inspection;
- in transportation and storage; and
- in food service and preparation.

Both the individuals and the organizations that make up this system have proven themselves to be creative, co-operative and forward-looking in their responses to change - attitudes which are essential if the system is to continue to work in an integrated, productive and efficient manner.

The modern agriculture and food system has been developing for centuries, with its members constantly and conscientiously working to plant the seeds and harvest the fruits of change. Perhaps the greatest changes in the history of this system have come in a wave during the decades after World War II - with a variety, complexity and scale beyond anything previously seen:

- horsepower and human labour were replaced by fossil-fuelled mechanized equipment;

- scientific researchers designed and developed synthetic fertilizers and pesticides, antibiotics and hormones which farmers came to trust and rely upon;

- production soared as high-yield seeds and livestock breeds came into wider usage;

- automated food processing and packaging made food safer, and last longer;

- large national food chains and international food broker networks bought, moved and sold produce with increasing efficiency;

- government insurance and support programs were introduced to protect agriculture from shifting weather patterns and market conditions; and,

- at the end of the food chain, sophisticated marketing and retailing networks sold the consumer lots of low-cost, safe, nutritious, attractive and convenient food products.

Twenty years ago, this modern system seemed to have almost completely met its challenges, and to have reached a point of completion - it had unprecedented economic power, unparalleled technical achievement, and unquestioned popular support. There was no doubt that the system had succeeded in adopting the changes necessary to meet its central challenge: to produce more food and at lower prices than ever before. At this time, the only questions which seemed to remain, concerned the speed at which this "Green Revolution" would spread through the Third World, and whether Canadian, American or Australian farmers would win the race to feed a hungry world.

Over the last two decades, a new set of challenges and opportunities has arisen, and with them, a new awareness - an "environmental" awareness. For thousands of years, conversations about food and farming have been guaranteed to range over a nearly fixed set of topics - yields, the weather, prices, the weather, quality, the weather. The emergence of this environmental awareness seems at times to have generated a bumper crop of emotion - resulting in confusion, frustration, and even confrontation. Passions run high around these issues, and at times it seems as though everyday words, labels and definitions are being narrowed and sharpened into weapons by the more extreme voices. For example, most of the terms below have become so emotionally laden that they are difficult to use in debate:

Organic Farming · Conventional Agriculture · Urban Sprawl · Fast Food
Land Preservation · Agri-Business · Biotechnology · Ecological Farming
The Family Farm · Synthetic Chemicals · Health Food · Factory Farming
Agricultural Subsidies · Self-Sufficiency · Natural Food · Mother Earth

It is a tribute to Ontario's agriculture and food community that the vast majority have chosen not to "pick sides" or to polarize the debate, but to uphold their tradition of openness to change, of listening and learning, and of experimenting with and adopting those new ways which they have found effective.

This rapidly growing environmental awareness within agriculture, along with the continuing openness to ongoing, incremental change, has borne fruit with the wider public as well. Recent opinion polls (such as one conducted by Angus Reid) have shown that the Canadian public regards farmers as one of the two most environmentally conscious industrial sectors. Public recognition of the increasing environmental awareness of the agricultural community has helped to ensure both that the wider debate has not become as polarized as it is in the oil, nuclear, automobile, forestry and other industries and that government environmental regulation has not been imposed upon agriculture in a blind or punitive manner.

In the surprisingly short period of two decades, the members of Ontario's agriculture and food system have not only developed a strong environmental awareness, but have altered their daily practices and their institutional framework to help meet this environmental challenge. Many Ontario farmers, retailers, processors and researchers have found that making an operation more environmentally sustainable can also serve to increase its economic viability. The development of more sustainable agricultural methods since 1970 has taken place so rapidly, utilized such a wide variety of techniques, and come from such a broad range of sources, that it has proven impossible to offer a strict definition of sustainability. Nor, perhaps, should we want to confine the development of more sustainable tools, methods and practices, within the bounds of any narrow definition. For instance:

- Some participants have drawn on the experience embodied in an "older wisdom" - recovering and re-emphasizing methods such as crop rotation and mixed farming.
- Some have applied the results of new research - including the latest "conservation-tillage" and "Integrated Pest Management" techniques.
- Some have built upon the strengths of the existing system - its pest-resistant strains, good animal nutrition, etc.
- Many have utilized the knowledge, insight and experience of all of these sources.

It is apparent that over the past twenty years, many of these participants have come to regard these more sustainable practices as simple "common sense". While there may be disagreement about the exact definition of "sustainable agriculture", and also about the degree of change needed over the next decade, a remarkable consensus has formed that agriculture and food in Ontario can and is becoming more sustainable.

The Ontario Round Table on Environment and Economy consists of two dozen individuals, drawn from a broad range of economic and social sectors: provincial cabinet ministers (Treasury, Environment, Agriculture and Food, Natural Resources, etc.), industrialists, farmers, scientists, environmentalists, trade unionists, bankers, consumers and native people. The Round Table was formed to help design and implement a strategy for "sustainable development" in Ontario - a concept stemming from the report of the Brundtland Commission to the United Nations (entitled **Our Common Future**). This report outlined the urgent need to integrate our environmental and economic attitudes and institutions. This need was captured in the term "sustainable development", which set out the imperative that:

> ***each generation ensure that its own activities in no way restrict the ability of future generations to meet their needs***

The Round Table responded with a consensus report (entitled the **Challenge Paper**), which found that almost every sector of Ontario's economy and society faced a similar situation, and was undergoing a similar transformation. This "Common Ground" was then sketched out sector by sector, and "sustainable development" was spelled out more fully in a set of six principles.

The goal of "sustainable development" has always been shared by members of our agricultural community, down through the generations. However, the central insight which flows from it has come as a bit of a surprise to many: that our daily activities can become both more environmentally sensitive and more economically viable. That is, the economy and the environment are not eternal enemies, but, in fact, natural allies. Sustainable development may require a fundamental reorientation of our research, shift in our technologies, re-ordering of our economic incentives, change in our purchasing habits, and so on. It will also, however, provide real benefits both to ourselves, and to our children.

The Round Table then asked this Food and Agriculture Task Force to provide a report outlining "how to implement sustainable development in the Food and Agriculture sector"; including:

- a review of sustainable policies and practices already in place or underway;
- an evaluation of opportunities and constraints associated with the implementation;
- a summary of the opinions and commitments of the key stakeholders in the sector;
- an inventory of further actions that need to be taken, with timetables and targets; and,
- recommendations.

Therefore, we have undertaken to explore this "common ground" more fully: to identify some of the obstacles to its successful cultivation, as well as the positive opportunities it offers. We will discuss the wide range of sustainable agricultural activities, and also outline some of the techniques, systems, attitudes and institutions we will require if they are to flourish. But before we enter that discussion, we should take a closer look at the environmental challenges that have arisen over the past twenty years, and provided the spur for Ontario's agriculture to become increasingly sustainable.

2. THE CHALLENGES OF RECENT DECADES

Our food and agriculture system has had to be exceptionally creative over the past twenty years to confront the whole range of environmental challenges and opportunities that have emerged. The highly successful heavily industrialized system of agriculture that arose between 1940-1970 appeared often to be unaware of these issues, unprepared to resolve them, and oblivious to the opportunities which they presented to the forward-looking producer. Some of the challenges which Ontario's producers, processors and consumers have faced in recent decades (and which the wide range of "sustainable" practices were created to resolve) are:

1. **The Global Farm Economy — As a result of the global agricultural economy, real returns to farmers have fallen for many commodities; farmers have found themselves increasingly squeezed between rising input costs and falling commodity prices.** This year's real corn, soybean and wheat prices, for instance, appear likely to provide farmers with only 20- to 40 per cent of the prices received 20 years ago. Real interest rates were at historically high levels through most of the 1980's as well, placing pressures on farmers who were now borrowing more than before in order to finance investments and the day-to-day running of their operations. In addition, the growing farm-subsidy war between Europe and the U.S. has helped force the agricultural subsidies in Canada to an average of $17,000 per farm during the late 1980s. The Free Trade Agreement and negotiations under the GATT also threaten to force a painful restructuring on a number of commodity sectors, agriculture included. The firms which process and market most of Ontario's farm produce are under equal economic pressure - to operate on a continental basis against American competitors who often have access to cheaper capital, labour, and farm commodity inputs. The difficult state of the agricultural economy has put a brake on more rapid development of sustainable agriculture over this past decade. To be sustainable, an economically viable agri-food system is necessary.

2. **The Global Environment — From the first Earth Day in 1970, everyone has become more aware of the need to "think globally and act locally".** At about that time, more people began to wonder if the growing world population (about 3.5 billion then, about 5.5 billion now) could be fed with some of the fossil fuel-dependent practices popular at the time. Ontarians then became aware of the measurable damage caused to crops by urban smog and acid rain. More recently, the threat of climate change has come to dominate discussion. Ontario's agricultural producers can safely adapt to climate change, whether warmer or colder, wetter or drier - if they are given sufficient time, information, and capital (to develop irrigation, plant new orchards, buy new equipment, etc.). However, the apparent recent increase in unpredictable weather has made decision-making more uncertain (What crops to plant? When to plant or harvest? What tillage methods to utilize? How much crop insurance to buy?).

3. **Health and Safety Concerns — Since the first storm over DDT more than 25 years ago, Ontarians have witnessed a stream of doctors, ecologists, toxicologists and other health experts holding well-publicized debates about the impact of persistent toxic chemicals in the food chain.** These debates focused on issues such as:

- thinning shells in bald eagle eggs;
- deformities among the fish and birds of the Great Lakes;
- carcinogens and birth defects;
- possible health threats to farmers;
- immune deficiency and developmental failures; and
- declining songbird, frog, fish and other wildlife numbers.

The challenge to date has been threefold: to improve our understanding of the workings of these chemicals, to minimize risks and to search for alternatives, and to replace the existing proven culprits with more benign pest control methods - whether biological, cultural or chemical. Nonetheless, these debates have exacted a toll on public confidence - since the same trusted scientific and medical personnel who introduced these substances after the war were now raising the alarm.

4. **Land Use Concerns — Many Ontarians have come to be concerned over the continuing expansion of urban areas onto farmland and into the countryside.** The initial decades after World War II saw the growth of suburban housing developments, shopping malls, highways, landfills and industrial parks to solve pressing public needs; but the continuation of this urban pressure on farmland (and of farm pressure on wetlands and woodlands) has stirred emotions and raised serious economic and environmental questions. Will there be enough farmland (and wetlands and woodlands) for future generations? What if the global climate changes? Can we recover farmland from existing urban uses?

5. **Soil Conservation and Water Degradation — Attention to soil conservation appears to rise and fall in cycles, with the 1980's being a period of increasing concern.** In areas where soil erosion, soil degradation and declining organic matter levels became problems, farmers were losing tens of millions of dollars worth of production annually, and a number of government programs were initiated to help conserve this most essential resource. Secondly, agricultural practices have been identified in some areas as a contributor (along with other sources such as municipal sewage and industrial run-off) to high bacteria, nitrate and chemical levels in wells. Some rivers, lakes and streams have been contaminated by sediment, manure, fertilizer, pesticide run-off and by-products of plant processing. The possible effects on the health of humans and wildlife, the waste of valuable natural resources and purchased inputs, and the damage done to the source of irrigation water have all helped push the system to better management practices.

6. Rural Community and Farm Family Survival — Considering the difficult state of the agricultural economy, farm families, processing plant workers and other rural residents are under constant strain to survive. In many cases, farm families have both parents working, are dependent on off-farm income to keep farming, and are unable to give as much time and energy to their children as they would like. The local community also suffers as its citizens are overworked and overstressed, as its young people are forced to leave to find work, and as the local tax base and services erode. In addition, these trying times place farm credit agencies, local bankers and farm equipment suppliers under stress and make chemical firms hesitant about spending millions of dollars to take new chemicals through years of testing.

7. Public Decision-Makers — Government decision-makers have found themselves increasingly less able to respond to the needs of the agricultural community; the on-farm population has continued to decline, while competing demands have arisen from an increasingly segmented social structure. The farm economy may be in need of increased public support (given the present global trade war and climatic instability), but the needs of consumers, the environment, health and other sectors cannot be ignored by any politician.

It is easy to understand why emotions would often temporarily flare over these issues and challenges. People have been faced with a situation of multiple uncertainty - economic restructuring, environmental concerns, market upheaval, new regulations and conflicting information coming onstream all at once. Therefore, periodic bursts of emotion have arisen, from: farmers who felt that they were being unfairly singled out for attack by bureaucrats, urban consumers and environmentalists who didn't understand farming; politicians who felt lost in a sea of subsidies and swamped by conflicting demands; processors and packagers who felt hopelessly squeezed by international competition, changing rules, and rising input costs; and consumers who didn't know whom to believe during these debates.

What has been exciting about these recent years is that many members of the agriculture and food community decided to meet these challenges head on, and found that - once over their initial anxiety - there were real opportunities to be found in education and change. Rather than ignoring criticism, they confronted it and reached out to the larger public by explaining farming practices; rather than reacting defensively to consumer questions about environmental and health issues, they saw growing markets for products grown with alternative methods; rather than fighting government requirements to reduce packaging, they realized that new packaging methods would reduce their purchased material and energy inputs; rather than turning a blind eye to new ways of reducing tillage, pesticide and fertilizer use, they participated in innovative government programs and harvested both environmental and economic benefits.

Again and again, across Ontario and around the world, in agriculture and every other sector, the same lesson is being learned. In the Chinese language, the word "crisis" is made up of two characters - one meaning "danger" and one meaning "opportunity". In business terms, the lesson is that what appears as a "problem" to some is seen by others as a potential "market". And in Ontario's food and agricultural community, a strategy of defence against any and all environmental "threats" has been replaced by a strategy of innovation, which aims to integrate environmental "challenges", and which finds opportunities where others only saw burdens.

3. SUSTAINABLE AGRICULTURE IN ONTARIO

In recent years, we can see that a broad range of innovative solutions have been created and developed in Ontario; innovation appears to be picking up speed. While the diverse and constantly changing nature of these approaches rules out any fixed and formal definition of "sustainable agriculture", it is clear that the practices discussed below are intended to ensure that the activities of our own generation do not restrict the ability of future generations to meet their needs.

1. **ON THE FARM — Ontario's farmers have been at the leading edge of the world-wide movement toward environmental sustainability.** Although the media often portray this shift as involving a battle between "organic" and "conventional" producers, in fact, the majority of Ontario's farmers are participating in this change on their own terms - under their own name, choosing their own methods, and moving at their own speed.

- **The centre of much public attention has been the hundreds of Ontario farmers who have committed themselves to making their operations as completely sustainable, as rapidly as possible.** Some of these farmers use the term "organic" to define their techniques, methods and philosophy. But it is unfair to set up a dichotomy between "organic" and "conventional" farming. Not only do these terms elude easy definition, many equally committed individuals prefer to live, work and farm under other names, or under no label at all.

- **Perhaps less immediately apparent to the media eye are the thousands of Ontario farmers who have quietly chosen to make their operations more sustainable by changing their practices incrementally.** The speed at which this change takes place depends on the particulars of each farm (its soils and climate, buildings and equipment, proximity to markets, the availability of labour and credit, its cropping mix and history) and on changes in public policies and programs (on extension, insurance, equipment, interest rates, marketing, etc.). Many began by utilizing conservation-tillage methods (it is estimated that over 1/4 of Ontario's farmers now utilize such methods), more crop rotations, or Integrated Pest Management systems. The farm organization AGCare, for instance (with its 11 member groups and 45,000 farmers) is committed "to act as a catalyst to promote the implementation of scientifically verified production practices which contribute to long term sustainability." It reinforces the imperatives of: providing a sound research basis; enhancing the economic viability of those farms pursuing sustainability; and of proving the practical merits of sustainable systems to those farmers who remain sceptical.

2. **IN THE MARKET** — Over the last two decades, Ontario's consumers have expressed a growing interest in:

- food that is grown with fewer synthetic inputs;
- food that promotes good health and nutrition and is fresh; and
- food that is grown by local producers.

While there are undoubtedly many other factors at work in the food purchasing decisions of Ontarians - price, convenience, appearance and variety, for example - nonetheless, many have begun to select and purchase the produce that they feel will better sustain their own health *and* that of the land. Although narrowly defined "organic" produce may make up only one or two per cent of the consumer marketplace, purchases of "health/whole/green" foods take place under dozens of separate labels and definitions, through specialty food stores, restaurants, farm gates, supermarkets and farm markets. This market has consistently grown more rapidly than overall food purchases.

Far from being an economic oddity, the emergence of any new market segment such as this, requires the initial support of a group of consumers who often have special needs, attitudes or characteristics. Their support is required in order to strengthen processing, distribution and retail channels; to secure sufficient returns to producers, so that they may then invest in larger-scale production, and thus lower the price; and to boost awareness of the product in the broader consumer marketplace. In Ontario, it is apparent that the once quite tiny and specialized market for these products has grown, to the point where every major food chain serves it - whether through separate sections, special labels, special advertisements, etc. The relevant questions at this point are:

- how will the consumer be informed of these product characteristics?
- how will the market ultimately be defined?
- how large will the market become?
- will domestic producers fill these markets, as well as any export opportunities?

Opinion polls have shown that in Ontario (as well as across Canada, the U.S. and Western Europe), an attitudinal shift has already taken place involving more than 80 per cent of consumers (Agriculture Canada). The question of whether consumers will back up their new values with actual purchases will depend in large part on product price and availability as well as on the degree of continuing cultural and political change. Nonetheless, the fact that consumer desire has shifted in tandem with the rise of other environmental issues and attitudes (e.g. toward recycling), and that this same attitudinal shift has taken place in every Western nation, should emphasize the need for Ontario to seize the opportunity to connect these consumer requests to the widespread shift of our producers toward sustainability.

3. IN GOVERNMENT — The Ontario Ministry of Agriculture and Food (OMAF) itself has been increasingly vigorous, both in its attempts to help farmers adopt more sustainable practices, and in its efforts to transform its own operations, programs and policies. Farmers have been able to participate in such programs as:

- **Land Stewardship I (and now II): supports practices that increase both soil conservation and environmental protection** - such as crop rotations, cover cropping, and improved residue management; better manure, pesticide and milkhouse waste storage and handling systems; and soil conservation techniques such as tree windbreaks, water control basins, stream crossings and so on.

- **Tillage 2000: supports the expanded use of conservation tillage practices** - to improve soil quality, water management, weed control, and to reduce energy use.

- **Food Systems 2002: targets a 50-per-cent reduction in pesticide use between 1988-2002.** This program has included the enormously popular Grower Pesticide Safety Course, which more than 30,000 farmers have taken; an expansion of Integrated Pest Management programs from 6 to 19 crops (programs which already have helped Ontario's farmers to reduce their pesticide use by 17 per cent from 1983-1988, resulting in the savings of millions of dollars).

In addition, OMAF has:

- revised its Mission Statement, Operating Principles, and Strategic Directions to reflect and further the move toward sustainability;
- set up an Environmental Responsibility Team to review the Ministry's internal operations; organized a broad farm-based Environmental Advisory group; and
- is an active participant in numerous other environmentally-related processes.

Other levels of government, from the City of Toronto and its Food Council to Agriculture Canada, are also moving to increase their educational, marketing, purchasing and distribution programs related to sustainable agriculture.

4. IN RESEARCH — The consensus that sustainable agriculture is both necessary and feasible has grown apace in the agricultural research establishment as well. The Science Council of Canada's Project on Sustainable Agriculture states that "The goal of sustainable agriculture is now broadly accepted at both the federal and provincial levels." The Canadian Agricultural Research Council and the Science Council are currently working on road maps for reaching that goal. The past Dean of Guelph's Ontario Agricultural College (OAC) has stated, "Sustainable agriculture is not an option. It is a necessity." The OAC is therefore exploring how to integrate sustainable agricultural methods throughout its entire curriculum. These groups, (and others such as the Ontario Institute of Agrologists) increasingly describe sustainable agriculture as "common sense" - a phrase which, as much as anything else, shows that future developments are likely to stress sustainable practices.

5. ACROSS ONTARIO — Numerous other dimensions of the agriculture and food system beyond the farmer and the consumer have also given evidence of a rapid move toward sustainability:

- **Food packaging firms** have committed themselves to the National Packaging Protocol and its goal of a 50-per-cent reduction in the solid waste of these products over the next decade.

- **Wildlife groups** are increasingly raising their own funds to support changes in land use and on-farm practices to protect wildlife diversity and habitat.

- **Cities** themselves are now working to restrain their formerly sprawling ways, from St. Catharines to Metropolitan Toronto, both to maximize the efficient use of their expensive services and infrastructure and to protect the integrity of the countryside.

- **Environmental groups and governments at all levels** are working to reduce agricultural (and other) emissions of greenhouse gases.

The movement toward a more sustainable agriculture and food system has taken place swiftly over the past twenty years in Ontario, but it is important to remember that agriculture is not the only sector to face this extraordinary set of challenges. Our society has been moving on all fronts toward a more sustainable way of life:

- "single-use" forestry has recently begun its transition to "sustainable forestry";

- energy conservation and renewable energy options are expanding;

- lengthy commutes by private automobile are being given a lower priority than public transit and urban redesign;

- Cold War hostilities are giving way to new Common Security defence agreements; and, (in perhaps the best parallel to agriculture),

- the "disease-treatment" focus of modern medicine is opening to include disease prevention, "health promotion" and "healthy community" initiatives.

It is important that this widespread social and economic transformation be kept in mind when weighing the necessary degree and speed of change within the agriculture and food system. Those who originally suggested that "the environment" was an issue limited to a small percentage of the population, or who said that it would disappear within a few months, have not just proven to be mistaken, but have also missed any opportunity to benefit as markets and technologies have changed. Those far-sighted individuals within Ontario's food and agriculture community who advocated environmentally related change have been justified by its steady rise over these decades (across economic sectors and even across entire nations), as well as by its growth within Ontario. Let's take a closer look at how the vital "on-farm" aspect of sustainable agriculture actually works - technically, ecologically, and economically.

(A) SUSTAINABLE FARMING

If we look at the farming practices in use as of 1970, we will find that many are a part of "sustainable agriculture" today. The difference between then and now lies not so much in what has been rejected over the years, but in the innovative practices which Ontario's farmers have created and applied since.

Fundamentally, the shift toward more sustainable systems is made possible by more deliberately integrating and taking advantage of naturally occurring, beneficial, biological interactions. The shift emphasizes the sound management of biological relationships (such as those between pest and predator), and of natural processes and cycles (such as nitrogen fixation), with the objective of sustaining and enhancing rather than reducing and simplifying "agro-ecosystems".

Many of those moving in a sustainable direction have found that a "philosophical" shift seems to take place as well, whereby they begin to consciously work with Nature, seeing it as an "asset", an "ally" and as being "alive". This changed perspective helps in the search for innovative yet practical solutions to problems. That is, farm practices and techniques that explicitly take into account the fact that soil is complex, alive and "breathing" - full of billions of micro-organisms, mites, earthworms and mammals - will produce very different results over time than practices that treat the soil as a simple mixture of mineral and chemical "dirt".

The specific objectives that more sustainable systems are designed to achieve include:

1. More use of beneficial natural processes (nitrogen fixing, pest/predator relations);
2. Reduced use of potentially harmful inputs;
3. More use of the biological and genetic potential of plant and animal species;
4. Better matching of specific crops to the land's long-term, productive capacity;
5. Better management of on-farm soil, water, energy, and biological resources.

These objectives of sustainable agriculture are not completely or uniquely met by any individual set of farming practices, and thus can include a spectrum of systems and methods - ranging from "organic" (and ecological, regenerative, biological, etc.); through to "low-input sustainable agriculture" (LISA); to Integrated Pest Management (IPM), conservation tillage and other practices.

It is clear that no useful purpose can be served by allowing any one group to set the definition of "sustainable agriculture" by itself, since no one has succeeded in perfectly meeting even the five objectives outlined above. (In fact, it is unlikely that anyone will ever find some purely "natural" way to farm, since all agricultural ecosystems differ from purely "natural" ecosystems

by using outside energy sources, artificially selecting dominant plant and animal species, and by using external human management controls, rather than natural feedbacks.) In our present situation of limited knowledge, time, money and energy, people must make trade-offs since:

- mechanical cultivation of weeds may produce more soil compaction than herbicide use;
- mechanical cultivation may also contribute to soil oxidization;
- "natural" pesticides may kill beneficial species just as a synthetic pesticide would; and
- animal manure may run off into water supplies just as a synthetic fertilizer would.

Sustainability then, is a diverse, complex, evolving movement, created by farmers and others, on the ground, and no individual group must be permitted to make it into a narrow box or straightjacket. Faced with such an urgent task, it is far more important to keep moving toward the goal than it is to stand and argue about whether we will ultimately get 92 per cent or 98 per cent of the way there.

(1) **PESTS: One of the most successful approaches to sustainable agriculture has been increasingly employed by Ontario farmers since 1969. Integrated Pest Management (IPM)** is a set of principles, techniques and methods used to minimize crop losses to insect pests, while at the same time minimizing the use of costly chemical pesticides and equipment.

- IPM works by closely monitoring the population of pests and of their natural predators and parasites, using techniques such as traps, pheromones, nets and simple field counts.
- The information generated by this network of "scouts" and farmers is used directly by the farmer, while also being integrated at a local agricultural research or extension centre.
- Insect population trends are then calculated, and an economic damage threshold is determined - with measures only being taken if the expected crop damage outweighs the costs of control.
- Detailed ecological knowledge of the pest's life-cycle and of their natural "enemies" is used as the basis of an effective control strategy, which can choose from a broad array of options:

  - **Chemical pesticides** are only to be used as a short-term, last resort, with precise timing, and using narrow spectrum chemicals wherever possible.
  - **Biological controls** utilize the pest's own natural enemies (parasites, predators and pathogens) to effectively control it.
  - **Pest behaviour can be disrupted** through pheromones (sex attractants), traps or barriers, or through the release of sterile/genetically-incompatible mates.
  - **Crop management** by cultivation, pruning, thinning, irrigating or manuring can strengthen the crop itself, or reduce the resources available to the pest.

- **System redesign** through crop rotation, intercropping, companion planting, trap crops, or habitat management can all reduce the opportunities for the pest.
- **Pest-resistant varieties** can be utilized in the next cropping season.

Detailed, on-the-ground ecological knowledge, and the co-operative nature of information gathering and distribution, have been combined with a philosophy of maximizing the use of practical alternatives to chemicals whenever possible. The result has been striking reductions in the use of costly chemicals to control pests. Ten years ago, the U.S. Office of Technology Development estimated that IPM could reduce pesticide use by 75 per cent. The U.S. National Academy of Sciences Report also endorsed IPM.

The best evidence is coming in from Ontario's own apple orchards:

- In the past, growers in the Niagara Peninsula would use up to a maximum of 25 sprays per season, if they followed the recommendations of government officials and chemical company representatives - at a cost of $1240/hectare in spray materials alone.

- Today, growers following OMAF's IPM recommendations have found they can achieve equally effective control of pests with only 11 pesticide applications, at a cost of $574/hectare. (In the home of IPM for apples, the Annapolis Valley of Nova Scotia, these methods have been developed over 40 years, and the average number of pesticide applications is down to 6 or 7.)

Thus, IPM techniques have reduced pesticide use in Ontario's apple orchards by 60 per cent; with a maximum savings on a 40 hectare orchard reaching to over $25,000 in spraying materials alone. (There are also savings on spraying equipment, labour-time, and fuel.) Not only do growers save time and money, but potential damage from pesticide run-off is drastically reduced. Finally, those consumers who choose Ontario apples over those grown in most of the United States will receive a real benefit in terms of peace of mind.

IPM is an economically and ecologically sound approach which can in no way be accused of being a step backward, or of being "unscientific". On the contrary, it is an advanced, knowledge-intensive approach to sustainable agriculture - as opposed to those 1950s-style mass production techniques which broadcast chemical pesticides according to a set formula and on a calendar basis. IPM employs a more integrated or "holistic" use of ecological and economic knowledge, which allows a more precise targeting of pesticides and introduces more systemic changes (protection of beneficial insects, crop rotations, etc.), which reduce the need for pesticides in the first place. In straight economic terms, knowledge and management inputs are used to replace capital and chemical inputs.

Central to our previous discussion, IPM permits step-by-step movement in a more sustainable direction. While it is in no way a panacea for all our pest problems - (it works best on tree-crops vs. field-crops, and is better on insects and mites than on fungi and weeds) - farmers,

researchers, extension personnel and local suppliers have begun to work together in interdisciplinary, multi-party groups to develop detailed, locale-specific ecological knowledge. It is a prime example of the kind of knowledge and type of co-operation which Ontario agriculture must develop in order to become more sustainable.

(2) **SOIL:** Beyond questions of pests, and at the heart of almost all sustainable practices, lies the soil - which was described in an article in last year's Scientific American as follows:

> ***"Soil is not just another instrument of crop production, like pesticides, fertilizers or tractors. Rather it is a complex, living, fragile medium that must be protected and nurtured to ensure its long-term productivity and stability.***
>
> Healthy soil is a hospitable world for growth. Air circulates through it freely, and it retains moisture long after a rain. A tablespoon of soil contains millions of grains of sand, silt and clay and has a vast expanse of internal surface area to which plant nutrients may cling. That same tablespoon also contains billions of micro-organisms, including bacteria, fungi and algae, most of which are principal decomposers of organic matter. Decomposition results in the formation of humus and the release of many plant nutrients. The microbes also produce sticky substances called polysaccharides that glue soil particles together and help it to resist erosion.
>
> Another essential activity that takes place in the soil is the fixation of nitrogen. Certain bacteria in the soil or in the roots of plants (most notably legumes) convert atmospheric nitrogen gas into fixed forms of nitrogen that plants and other organisms use to make proteins. The amount of available nitrogen strongly influences soil productivity."

This notion, that the soil is actually alive and full of organisms that are our allies, is central to sustainable agriculture. The problem is that most human activities damage soil-life in some way — by exposing them to the sun through cultivation or by leaving the soil bare; by starving them through not returning our wastes to the soil or by continuous cropping; and by compacting them with heavy machinery; by applying pesticides and fertilizers.

Any kind of agriculture will place stress on the soil by utilizing these kinds of practices. Sustainable agriculture attempts to become conscious of these stresses, and do as little damage as possible to this soil-life, yet still produce abundant crops over the long-term. It utilizes "soil-building" practices such as:

- crop rotation;
- the addition of manure, compost and crop residues;
- expanded tree-planting on sensitive and erodible land; and
- conservation tillage.

In properly managed, integrated systems, the benefits of improved soil quality can include:

- less use of expensive fertilizer inputs;
- better weed control;
- better tilth (so less time and fuel is spent tilling);
- less susceptibility to drought;
- less run-off and soil erosion;
- better wildlife protection and increased biodiversity;
- higher organic content (each per cent of organic matter fixes up to 40 tonnes of CO2/hectare.)

Conservation-tillage techniques - now used by approximately 1/4 of Ontario's farmers - are transforming the face of agriculture by reducing the use of that ancient implement, the plough. Low-till and no-till equipment attempts to prepare the soil for the seed in ways which keep crop residue on the soil surface. By maintaining a constant protective cover on the soil, it minimizes erosion from the wind and rain. Soil erosion, by lowering crop yields and by contributing to the sedimentation of waterways, costs Ontarians more than $100 million annually. The fact that conservation tillage can result in 50-90-per-cent reductions in erosion is of real value not just to farmers but to the average citizen.

In addition, many farmers have found that their overall yields either remain the same or decline only by a small percentage with conservation tillage, thus making it economically worthwhile since it also reduces fuel, labour and equipment expenditures. It also works to conserve soil moisture, a feature which may stand it in increasingly good stead in the future. Once again, however, conservation tillage should not be looked at as a panacea. It works better on light and sandy soils than on heavy, clay soils; and it has under some conditions led to slightly higher herbicide usage. Nonetheless, the development of these techniques is of enormous potential importance for agriculture, and their integration with crop rotation and other techniques bodes well for sustainable agriculture in the coming decade.

(3) LIVESTOCK MANAGEMENT: Some farmers are obtaining economic and environmental benefits by combining animal and crop production systems. The integration of crops and livestock makes crop rotations and the use of animal manure (raw or composted) easier, thus reducing input purchases, while boosting soil fertility and quality. Other farmers are changing their livestock management practices, for instance, under the impetus of Ontario's own "Herd Health" program, which focuses attention on the promotion of animal health - thus minimizing costly pharmaceutical treatments. Some farmers are developing lower-confinement systems, and are finding that lower stress upon the animals reduces the incidence of disease. In addition, these more diversified operations are likely to be less susceptible to economic or ecological disruption.

Lest anyone think that these results are somehow limited to Ontario, we can take a brief look south of the border. Less than two years ago, the U.S. National Academy of Sciences -perhaps the most prestigious body of scientists and researchers in that nation - released a study of what we are calling "sustainable" agricultural systems, which had been five years in the making, and which was conducted by a committee consisting of individuals from some of the most highly-regarded established agricultural research programs.

Their principal conclusion on the effectiveness of sustainable practices was that:

> ***"Well-managed alternative farming systems nearly always use less synthetic chemical pesticides, fertilizers, and antibiotics per unit of production than comparable conventional farms. Reduced use of these inputs lowers production costs and lessens agriculture's potential for adverse environmental and health effects without necessarily decreasing - and in some cases increasing - per acre crop yields and the productivity of livestock management systems."***

Their #1 Recommendation stated that,

> ***"Farmers successfully adopting these systems generally derive significant sustained economic and environmental benefits. Wider adoption of proven alternative systems would result in even greater economic benefits to farmers and environmental gains to the nation."***

There are, as mentioned above, dozens of other practices, systems, innovations and improvements that increase the sustainability of agriculture. Many are of value not just to the environment, but to the economy as well - both of the individual farmer, and of the province as a whole. What is needed today is a concentration upon the "next steps" in the movement toward sustainability: ensuring that any barriers are removed as swiftly as possible; integrating programs and practices, incentives and information, so that their benefits are maximized; and working to bring Ontario's farmers and all other members of the food chain together for a concerted effort in the coming decade.

RECOMMENDATIONS

There is a mass of information in Ontario and in the world agriculture community on sustainable practices that ought to be synthesized and systematized in a form that encourages the best management of the natural resources of the countryside. In particular, sustainability can be encouraged by creating guidelines and goals. These should be seen in a dual light, as recommended guides to practice, based on the most current and reliable information, and as goals against which progress towards greater sustainability can be evaluated.

It is recommended that:

• CODES OF PRACTICE FOR ONTARIO'S FARMERS

1. Codes of practice be drafted to encourage a range of practices which support a healthy environment and a sound economy and which set standards against which actions can be measured and assessed.

2. These codes of practice be regularly reviewed and updated, in light of scientific information and practical experience.

3. These codes be sufficiently flexible to incorporate new information, new research, new technologies and new opportunities as they arise. Hence, they should not offer any final or complete "definition" of sustainability. Rather, they should recognize the continuing growth of responsibilities and opportunities.

4. These codes support a broad range of practices - paying special attention to the need for: flexibility in the face of diverse local agroecosystems, practical experimentation, and sensitivity to changing consumer and marketplace needs.

5. As with the animal care codes, these voluntary codes of practice be drafted by a knowledgeable, multi-stakeholder board representing farmers, consumers, researchers, conservationists, health officials, retailers, processors, suppliers, environmentalists, provincial ministries, wildlife groups and local communities. Farmers shall constitute a majority of this board.

6. These codes be developed for use by farmers by Spring 1993

• LOCAL DELIVERY AND CO-ORDINATION

Since much of the information, awareness and experience required for more sustainable agriculture exists "out in the field" and "at the grass roots", it is recommended that:

7. OMAF, in co-operation with other bodies, bring together, on a local basis, farmers and other stakeholders and their organizations, to share information, knowledge and experience.

8. OMAF ensure that all relevant data, options, resources and technical expertise are collected, co-ordinated, analyzed and made available to support these local groups and interested parties. It should also develop a strategy to facilitate communication between regional, provincial, national and international groups and these local organizations.

• INTEGRATING PUBLIC INCENTIVES, INFRASTRUCTURE AND INSURANCE

The current set of government policies and programs was designed to support farmers as they pursued specific market opportunities. Central to their logic was the need to provide the equivalent of yield and price stability for specific farm commodities. In addition, farmers were provided with support to offset their input costs - through tax exemptions for fuels, fertilizers and chemicals. Later, attempts were made to reduce the impact of high costs of credit. Many other incentive programs have worked to persuade farmers to invest in particular technologies, from tile-drainage to manure-handling systems.

The opinions of the Task Force on the consequences of these policies were not unanimous. They ranged from (a) that policy had had no impact on the environment, to (b) that it had often been environmentally unsatisfactory. While some felt that the increasingly difficult cost-price squeeze prevented farmers from adopting more sustainable practices, most felt that government policies had inadvertently failed to support many sustainable practices, and in fact had sometimes tilted the playing field against sustainable practices such as expanding cover crops, diversifying, keeping marginal and sensitive lands out of production, reducing the use of purchased inputs, and relying more on naturally occurring processes to boost plant nutrition, animal health and pest control.

Some felt that the way around these problems was to investigate critically the programs making the greatest immediate impact on farmers' incomes. For instance, instead of making payments for protection for short-run declines in market prices on the basis of commodities grown or on the numbers of livestock sold, the same measure of support should be provided through a net income stabilization program. Then the gross sales obtained from producing a particular commodity would be less important than the important bottom line - how much income could be earned from the farm. This would remove the incentive to maximize the areas used for crop production, and encourage greater diversification and a lower use of inputs. It would also have the important additional advantage of not making farm income support programs theoretically subject to countervail according to the trading conventions of the GATT.

The opinions of the Task Force as to whether or not these policies needed to be adjusted diverged. The two chief concerns were (a) the possibility that farm incomes would be negatively affected by any governmental shift toward an untried support scheme, to (b) the necessity of re-examining, and ultimately, adjusting government policies - after negotiation and with a phase-in period - to focus more fully on the following principles and objectives. However, new policies achieve this goal, whether through income or commodity support, they should not reduce aggregate support to the farm sectors. Therefore, it is recommended that:

9. All existing government programs be examined and modified as necessary to ensure that they support the movement towards more sustainable practices. There should be no decrease in aggregate farm support.

   Any review, and any changes, be done in consultation with those affected.

The Round Table asked all the sectoral task forces to re-examine the current structure of federal and provincial subsidies so that sustainable practices and full cost accounting are encouraged. Therefore, some members of the task force feel recommendation #10 should include an assessment review of phasing-out existing tax exemptions on fertilizers and pesticides. As stated earlier, the Task Force's view, however, was that any review should not result in decreases in farm income. It is recommended that:

10. Any revenues generated from changes made to the tax and stabilization systems to reflect the principle of full-cost accounting have no negative aggregate impact on net farm income.

11. By the same reasoning, and in line with full-cost accounting, the Province (in conjunction with commercial banks, the Farm Credit Corporation, and those NGOs with a particular stake in a sustainable countryside) consider some method to reduce costs to those farmers planning to invest in the equipment and training associated with the adoption of more sustainable methods.

• AGRICULTURAL RESEARCH AND TECHNOLOGY TRANSFER

Ontario's agriculture and food industry must keep pace with global changes in market conditions, consumer demands and environmental challenges in order to grow, prosper and increase self-reliance. Fundamentally, there is a need to change the organization and priorities of research.

Achievements in basic research - on tillage, yields and crop varieties - have brought productivity gains to Ontario agriculture. We should continue this research, as required, but we also need to emphasize a systems approach, one that takes into account productivity and sustainability. To date, the focus of much private sector research has been on areas which could potentially benefit the sales of particular products. In addition, the predominance of American and other international firms, both in the financing and location of research, has meant that the particular ecological and economic needs of Ontario's producers have been underplayed. Therefore, it is recommended that:

12. Governments, universities and the private sector re-emphasize:

    (a) the provision of practical information suited to the circumstances of Ontario's farmers;

    (b) on-farm practices as working systems, rather than as collections of parts;

    (c) the examination of the particular market opportunities open to Ontario's farmers today.

13. To reflect this change in priorities, research must increasingly:

(a) involve multidisciplinary teams, able to synthesize the ecological and economic aspects of farming - from tillage/pest control/nutrient management/cropping methods to labour/education/equipment/credit/markets.

(b) link these teams directly with working farms and farmers themselves, whose particular real-world systems and ecosystems perform rather differently than under laboratory conditions - especially since many of the most exciting developments toward a more sustainable agriculture have been initiated by and are growing under the care of these farmers. (In many cases, these on-farm experiments need to be monitored and the results gathered, so that other farmers and researchers might benefit.)

(c) seek input from those individuals and organizations familiar with the market end of the food chain - from retailers and consumers to economic and financial analysts.

(B) THE LAND

Underlying all questions about the sustainability of our on-farm activities is the reality of the land itself. Most Ontarians have a powerful sense of roots, and a strong emotional "Love of the Land" - not surprisingly, since most of us, both long-time residents and recent immigrants, are within living memory of "life on the land."

Twenty-five years ago, the debate about converting or preserving the land could be essentially reduced to one phrase, "plough it or pave it". Land existed for two major reasons: (1) to raise food; or (2) to support urban living and industry. In the end, a province-wide consensus formed around the "paving" principle - Ontarians needed more highways, housing, industrial parks, landfills, sand and gravel quarries, shopping malls, gas stations, schools, hospitals, and parking lots; the need for more food seemed rather less pressing; and the need to protect greenspace, wetlands and wildlife, and ecosystem was a distant last. At that time, the best way to meet our needs for transportation, housing, and landfills was to buy "raw land" and develop it *for* these "higher" uses. Besides, agriculture was producing more food on the same land every year; and one could always drain a wetland or clear a wooded area if new farmland was needed.

TRANSITIONS: This clear sense of an either/or choice - as well as a clear priority of uses - is something we can only marvel at in 1991. Just like agriculture, owners and managers of Ontario's land find themselves in a confusing situation as the public's needs, values, dreams and demands are transformed and there is the rise of a new set of priority values, all of which seem to point in the direction of "greener" uses:

- **Food Security:** (1) The continuing rise in world population (from 3 billion to 5.5 billion in the last 25 years); (2) the lesson that basic commodity prices are subject to enormous political and economic swings (especially since the rise of OPEC); and (3) the recent global warming trend (with its increased likelihood of droughts, storms, crop stress, floods, etc.) - all point in the direction of preserving and securing our food-producing land base. This is the primary sense of food security used here: the preservation of agricultural lands for present and future needs. But, the discussion on food security encompasses many topics. Food security can be regarded in at least four other ways. In view of the continuing rise in the world population, it may mean a policy that stresses increasing agricultural exports to other nations. It may also mean self-sufficiency - that is, the creation of stockpiles and the use of incentives to maintain a sufficient quantity of essential foodstuffs as a cushion against drought and other climatic events. Self-sufficiency may also connote self-reliance, that is, a vibrant local agricultural economy that produces a variety and quantity of basic foodstuffs sufficient to avoid dependence on imported food. Finally, food security may refer to measures to ensure the quality of food.

- **Love of the Countryside:** Recent decades have witnessed the rise of a generation which appears to value the land, the countryside, greenspace and wildlife significantly higher than the preceding postwar generation did. Whether this change is rooted in socio-economic factors (family income, education levels, number of children, etc.) is unclear, but the rising priority is undoubted. Ontarians increasingly want open spaces, greenspaces, working landscapes and wildlife for recreation, for aesthetic reasons, and for simple spiritual renewal.

- **Ecological Care:** In a similar vein, people are concerned that ecological communities and the carrying capacity of the land not be constrained or destroyed by our activities. In its most obvious manifestation, people have acted in hundreds of communities to block the conversion of agricultural land into new suburbs, malls, landfills and highways. Similarly, though perhaps less obviously, the rising public value placed on wetlands and woodlands reflects this trend. No longer can farmers hope to "drain" or "clear" new land, without public opposition. The population wants these features protected, enhanced, and even recreated - whether for wildlife habitat, for water-holding and purification purposes, or for the carbon-fixing powers of trees.

What we see, then, is that all arrows point in the same direction - that the new value hierarchy of land use places "cloverleafs, strip malls and landfills" rather lower than "clover, mallards and waterfalls". In economic terms, this is no surprise, since: (a) population growth has slowed; (b) industry is less material-, energy- and land-intensive today; (c) many of the major infrastructure networks are essentially complete (from highways to public schools); and (d) there are, quite simply, diminishing returns from continuing such processes as draining wetlands. The demand end of our land use equation is now shifting in a greener direction; on the other hand, the supply of farmland, greenspace, wetland and woodland has obviously declined as well. Therefore, it is only reasonable that the value which the public places on the green use of these lands is rising.

ATTITUDES: In light of this new configuration of public values in Ontario, we must determine what needs to be done in order to meet these new priorities. At the very least, we need to rethink our approaches to the land, perhaps by applying some of the principles stated in the Challenge Paper. For instance, we must:

- **Begin to identify, account for and incorporate the full costs and benefits that derive from all land uses. (Full Cost Accounting).** Previously, we only included the economic benefits of a larger tax base for local municipalities, or of increased food production from agriculture land. We need to begin including obvious benefits such as wildlife habitat, recreation, and air and water purification. This will also require that we stop subsidizing those activities which no longer turn out to be providing net public benefits.

- **Recognize that the seemingly insignificant, incremental "costs" of urban sprawl eventually cross long-term thresholds. (Anticipate and Prevent).** Cumulative development impinges on farming activities, for instance, when traffic makes local farming operations unworkable; when local land prices make the start-up costs for new farmers nearly impossible; when the continuing loss of local production leaves local food processing plants underutilized. The same process occurs in ecological terms; wildlife may need continuous corridors, or a sufficient island of habitat to survive. Once these thresholds are crossed, the loss may be irreversible, or only reversible at great cost.

- **Recognize that farmland embodies more than simply the capacity to grow food. (Integrated and Informed Decision-Making).** Land must be understood and managed as part of an ecosystem, since what happens to the soil, air, water, vegetation and animals in one location can have profound effects elsewhere. Thus, preserving a particular wetland on a farm will require us not only to prevent the direct conversion of that wetland to another, less appropriate use, but also to ensure that the nutrients in the water entering the wetland are not sufficiently changed to degrade unintentionally its ecological integrity. This means that the protection of these resources will require preventive management covering a far greater geographic extent than the target areas themselves, and a more sophisticated approach to planning than has been the case to date.

- **Recognize that the effects of our uses of the land are often not simple, nor easily reversed. (Respect For Nature and The Rights of Future Generations).** Economically, land is not something which can be costlessly used in any way we choose, since we can neither instantly increase the supply of "desirable" types of land, nor easily reverse some of our land-use decisions. More than that, land is finite; it cannot be created at will. Ecologically, land lies at the heart of the great natural cycles and ecosystem functions which "carry" ourselves and other species; and it has come down to us as a gift - created by the Earth and the living things upon it. Together, these features should strengthen our resolve to act responsibly, and ensure that the land is passed on, well cared-for, to future generations.

- **Recognize the economic costs that urban sprawl places on urban centres and citizens themselves. (Quality of Development Over Quantity).** Quite simply, urban sprawl makes it more expensive for cities to provide infrastructure and services, such as public transit, sewers and water, daycares, schools, hospitals and policing. Most crucial from a sustainable development perspective is the necessity of reducing urban air pollution and greenhouse gas emissions by expanding public transit. Public transit, in turn, requires intensified urban living, and is not cost-effective when serving a sprawling population. In recent years, this awareness of the need for higher-quality, intensified urban development is growing from within the cities themselves, a change which will finally restrain sprawl from the inside. Metro Toronto's one-year freeze on expansion is perhaps the best example of this. Urban sprawl also impinges on the quality of rural life; the expansion of urban activity disrupts traditional patterns of transportation, commerce, and social behaviour, without offering compensation.

DRAFT RECOMMENDATIONS FOR DISCUSSION

The opinions of the Task Force on the priority of agriculture in relation to other land uses ranged from (a) that prime agricultural land (Classes 1-3) should take precedence over other uses, to (b) that agriculture was a central, but not the only, means to provide environmental benefits. The majority of the Task Force recommends that:

14. The Province commit itself to the enhancement and protection of the rural lands (resource base) necessary for food production, open space, biological or wildlife habitat, and heritage preservation for present and future citizens.

15. The government develop comprehensive legislation for rural land planning and use, including a statutory requirement that municipalities, Ministers of the Crown, boards, judicial and non-judicial agencies and commissions identify, protect and enhance ecosystems.

Planners in Ontario already make extensive use of existing land capability classifications, most notably the Canadian Land Inventory, to identify and rank lands according to their agroclimatic, wetland, forestry and other natural resource potentials. The Province should continue to rely on these systems until new ones can be developed, as described below. There is a need for an agency to monitor land use and administer the relevant statutes. The Task Force does not desire that this agency involve a new level of bureaucracy if it is not necessary. It should rather take advantage of existing resources. The Task Force would prefer, for example, to see better co-ordination of the existing agencies involved in rural land use. This might involve a more systematic approach to land administration, by reinforcing and consolidating existing authorities, such as Conservation Authorities, Parks Commissions and the like, and by creating local commissions or agencies where none currently exist, Among province-wide institutions, such as agencies and government ministries, there is also need for greater co-ordination. This would still require a central co-ordinating body with overall responsibility for land use in Ontario. How this responsibility is to be defined remains open, but at very least, this central agency should, like the Ontario Human Rights Commission, be able to investigate and adjudicate local issues, as well as regularly report on the state of the land. It is recommended that:

16. Under this legislation (recommendation 15), a Countryside Commission be established to:

    (a) determine, evaluate and monitor the state of the countryside;

    (b) develop a new classification system to identify, from a regional, provincial and national perspective, key natural resource areas incorporating the following considerations:

    - the potential values of particular natural resources in an area under various optional uses;

- uncertainties and forecasts about future requirements for particular uses of the resource;
- the scarcity of the resource, and the ease with which changes in its characteristics are reversible;
- the availability of alternative sites for the use in question, and alternative uses *of* the site in question.
- the interrelationships between those natural resources required to maintain the ecology of an area.

(c) develop planning guidelines for local governments to follow in order to identify and maintain the integrity of priority natural resource areas, and to assure both the ecological and the economic well-being of the planning area and its population.

(d) have the authority to report to Cabinet to ensure government awareness of the draw on resources and of the need for enforcement of policy or for new, more restrictive policy;

(e) provide a regular report to the Legislature on the state of the resource base, future requirements and the effectiveness of current management systems;

(f) advise Ministers on the potential impact of new policy and ways of mitigating adverse effects on the resource base;

(g) advise other agencies engaged in land stewardship programs or in activities that affect the quality and quantity of land, soil, air, water or natural biological resources of the province;

(h) facilitate resource stewardship through mechanisms such as trusts, private benefits, (e.g. tax incentives for care of resource etc.) and the tapping of public and private energies and monies through education, networking, etc.;

(i) advise landowners of the characteristics of their property that have particular regional or provincial significance;

(j) operate a fund based on private sector donations as well as allocations from ministries, for multisectoral stewardship programs (to be contracted out to third parties e.g. trusts, easements, universities or soil and crop improvement associations);

(k) have the authority to present the case for countryside preservation before all boards, agencies etc. (e.g. the Niagara Escarpment Commission).

17. That the Commission's operating requirements be obtained by co-ordinating and consolidating the considerable funds and personnel which both levels of government, as well as other groups (e.g. North American Waterfowl Management Plan) have already committed for land stewardship. Some of these funds and human resources should be consolidated into a strategic information unit to improve the knowledge base and integrate the programs of these various agencies.

18. Legislative changes should be introduced to facilitate innovative new mechanisms to preserve those lands most under stress; to facilitate public awareness, support and involvement (financial and other); and to avoid unnecessary hardship for current land owners, e.g.:

(a) Land Trusts: Private and public trusts able to: purchase conservation easements; purchase land (fee simple) to lease back for the long term or sell, after establishing an easement on *the* title to prevent development; accept donations with tax incentives (as per the Ontario Heritage Foundation); and accept and manage surplus public lands (e.g. Pickering lands).

(b) Easements: Legal documents, which place restrictions on the use and development of a parcel of land, usually privately owned, in order to preserve or conserve its natural features. (These could be allowed under the Ontario Heritage Act [Natural Heritage League], the Government Service Act, or by new legislation). These could be used in natural areas or for those prime croplands most under stress from urbanization, and could be financed through:

- private sector investment through private trusts;
- public sector investment through agro-bonds or provincial debentures;
- donations of land by the owner being sold by land trusts to farmers, with the resulting funds then being used to purchase further easements.

(C) INFORMATION, MARKETING, PROCESSING AND PACKAGING

The Challenge Paper states that the immediate challenge is to bring environmental considerations into the mainstream of economic decision-making and planning. This challenge must be extended to every member of the food chain, which stretches out from the farm through *to* processing, packaging, distribution, retailing, preparation, consuming and then into waste management. Each of these areas has a whole range of forces and factors, problems and opportunities unto itself, but the Task Force found there was a consensus for a number of actions intended to help achieve environmental and economic sustainability beyond the farmgate.

RECOMMENDATIONS

• INFORMATION, LABELS AND CERTIFICATION

Many consumers appreciate being informed about the way their food has been grown and processed. It should be possible to build upon our earlier successes in presenting relevant information clearly and accurately - so as to meet the increasing public demand for information, while minimizing the potential for any unnecessary, speculation-based "food scares". Therefore, it is recommended that:

19. A full and complete multistakeholder examination be undertaken into ways to communicate that produce was grown under conditions ensuring the health and vitality of the soil, water, air, wildlife and livestock.

As this examination is taking place, the Task Force recommends that:

20. A public information line be established for consumers, journalists, health professionals and any other citizens wishing to obtain information on the:

    - Safety and wholesomeness of Ontario's agriculture and food products;

    - Environmental practices currently employed by producers and processors;

    - Principles of food-handling and the 3-Rs of waste management.

21. A system for identifying and labelling "sustainably produced" products be developed by a multistakeholder panel.

22. An identification and labelling system for specifically "organic" products be developed.

23. A system for the verification of "sustainable", "organic" and other product claims be developed (to ensure their validity and uniformity).

Ontario cannot achieve either environmental or economic sustainability in isolation; rather, our actions and our solutions must support national as well as global efforts and initiatives. Therefore, these information, identification and labelling systems will need to be coordinated, both across sectors, and amongst a number of levels of government.

• MARKETING AND PROMOTION

Without markets for Ontario products there can be no economic sustainability. In today's increasingly global marketplace, with its changing environmental and economic trends, there is an increased need for co-operation and collaboration among NGOs, industry and government. Ways must be found to break down mistrust and to bridge the gaps of misunderstanding that have grown up between these actors.

Food retailers, packagers and processors, producer groups and marketing boards, environmentalists, consumer groups and public health organizations, as well as governments, have a real opportunity to unite in the promotion of Ontario's sustainably grown products. Factors other than price - such as freshness, flavour, nutrition and environmentally responsible production and processing methods - may be promoted in a way that influences buying patterns, locally, nationally and globally. However, it is necessary that all these sectors, from producer groups to retailers, from NGOs to government ministries, increase their detailed understanding of, and responsiveness to, these marketplace needs and trends.

There was a range of opinion concerning the degree and timing of support or protection to be given to these food products, from the view that (a) we may already need to stop the import of "unsustainably produced" products, to the view that (b) we must, at the least, immediately begin a positive marketing campaign, outlining the existing and ongoing movement toward sustainability by Ontario's farmers. The Task Force recommends that:

24. Existing promotional campaigns, which increasingly stress the freshness and taste of Ontario-grown produce, as well as the value of a cared-for countryside, be built upon. This could begin with a campaign emphasizing the quality of the soil, the protection of our water supplies and wildlife, the nutritional value and safety of the food itself, the care placed upon the land, the security provided against drought or any food shortage, and the support of mixed family farming operations - all offered by Ontario's sustainably grown farm products.

Following this recommendation could give Ontario farm products a trade advantage against other, less sustainably grown imported foodstuffs, as well as further stimulate Ontario's sustainable agricultural systems. It is also recommended that:

25. Retailers support such Ontario products through shelf space and advertising.

26. Public sector organizations and institutions purchase such Ontario products wherever feasible.

27. Research be conducted jointly by government, industry and NGOs to determine the domestic and global market, existing and potential, for Ontario's sustainably grown products.

• FOOD PROCESSING AND PACKAGING

Waste management and reduction audits already conducted by many food processing, packaging and retailing companies have resulted in a significant reduction in solid waste going to landfill, while also contributing to the movement toward environmental sustainability. In addition to the pressing need to survive against international competition, these companies must ensure the safety, freshness and wholesomeness of products, while also providing consumers with the information they require. Therefore, there is a real need to balance these interests with the need for waste reduction, re-use and recycling. To date, industry has been a leader in the development of agreements such as the "National Packaging Protocol". However, there is room for a continued and more rapid shift toward sustainability. The Task Force recommends:

28. Multistakeholder co-ordination, co-operative funding and support of government, industry and the NGOs for programs to further the reduction, re-use and recycling of the wastes generated by food processors, packagers and retailers. This can be effected by:

    (a) The development of "Codes of Practice" for waste management in the food industries;

    (b) The development of systems for collecting and converting organic wastes from food processors, packagers and retailers;

    (c) The development of systems for the expanded collection of urban and rural, residential, commercial and industrial wastes;

    (d) The development of alternative uses for organic wastes;

    (e) The introduction of tax incentives to encourage the reduction, re-use and recycling of solid wastes.

In many cases, food processing, packaging and retailing technologies, equipment and products themselves are primarily developed in other countries and then transferred to Ontario. Therefore, the Task Force recommends:

29. A greater absolute level of research and development expenditure by Ontario's governments, universities and private industry, directed towards opportunities such as:

    (a) New food processing/preservation techniques and methods that will support:

        - the safety of food and the reduced use of chemicals;
        - the efficient use of energy and materials;
        - the reduction/reuse/recycling of wastes;

    (b) New information display and retailing systems;
    (c) New food processing technology for Ontario-produced raw materials;
    (d) New value-added products.

The sustainability of Ontario's food processing and handling industry requires greater public and private investment in skills and knowledge development. Therefore, it is recommended that:

30. There be greater multistakeholder cooperation in the setting of college and university curricula for: food processing technology, waste management practices, and management and employee skills development and training.

(D) RURAL DEVELOPMENT

INTRODUCTION: "Comprehensive rural development" is emerging as a global response to the rising need for rural sustainability: it recognizes the need for balanced rural communities; addresses economic, social and environmental needs; and bases itself upon local capacity and initiative. Government must act as a partner with local communities, building upon existing resources and aiming toward long-term viability.

BACKGROUND: Rural Ontario is not homogeneous. Significant variation exists as a result of the impact of economic, social, demographic and technological changes:

- **Some rural areas dependent upon agriculture** - have been negatively affected by the "restructuring" of the agricultural industry. A number of indicators suggest that these trends will continue. The resulting shift in economic status has focused rural attention upon the future of industry, the rural resource base, and the long-term relationship between agriculture and non-traditional rural activity.

- **Some rural areas with access to large urban centres** - have diversified, thus easing the impact of any decline in the agricultural economy. Many of these traditionally agricultural areas face an influx of urban populations, and are experiencing community identity and land use issues of a rather different nature.

The declining farm economy has made the interdependency of agriculture, the rural economy and rural community more apparent. Both the economic viability and the quality of life of rural communities is currently being challenged. Innovative solutions are required to ensure the sustainability of a rural Ontario that protects the natural environment, ensures the strength of the agricultural component of a diversified economy, and maintains rural community life.

ISSUES:

- **Off-farm Income:** While agricultural production is increasingly dominated by large farms, the number of small and mid-sized farms has declined dramatically. Trends clearly indicate the increasing dependence of the family farm upon either off-farm sources of income or upon a more diversified farm income. Local employment opportunities are increasingly essential to keep Ontario farms in production and to maintain the stability of rural communities.

- **Out-migration:** The out-migration of rural people in search of employment opportunities is most evident among the young, the skilled and entrepreneurs - losses which are difficult for any community to sustain.

- **Economic Instability:** The agricultural economy has also been vulnerable to global trends, international agreements and shifts in local consumer preferences. Some sectors have been particularly affected by these fluctuations (e.g. tobacco and grapes.)

- **Infrastructure and Service Stress:** Stresses on rural infrastructure, social and health services increase as some communities attempt to meet the demands of a growing population, while others strive simply to maintain services in a time of decline. Although larger centres are experiencing similar pressures, the relatively small tax base and less complex service structure found in rural areas reduces their options.

- **Community Identity and Population Change:** Traditional community boundaries are being eroded by shifting populations and by residential development outside of community centres. The general integration of agricultural and rural residential development has raised issues in a number of areas: competition for land by urban and rural non-farm residents has influenced the price of farmland, and increased the demand for services and land severances; and the mix of rural residential lots and farms has led to challenges to traditional farm practices, with odours, noise, and the configuration of farm buildings being found offensive by some non-farm residents.

- **Land Stewardship:** Farmers have traditionally acted as stewards of the land. With the decline in farm numbers and the need for enhanced economic activity, issues of appropriate non-farm land use emerge - issues which are both complex and often conflict-ridden. Key questions are emerging concerning the relative environmental impact of both agricultural and non-agricultural uses of the land.

- **Non-Agricultural Rural Resources:** In addition to its agricultural resource, rural Ontario is increasingly recognized as an aesthetic natural resource - one which enhances the quality of life and the character of the entire province. The need for change to be less unplanned than it has been in the past is evident if these limited resources are to be protected and enhanced. The quality of the rural countryside currently evidences itself through the recreation and tourism sectors of the rural economy, and also through the significant proportion of farms owned by urban people as country or weekend homes.

POTENTIAL RESPONSES

Economic Diversification: A stable and diversified economy will lead to increased employment opportunities. Provincial involvement through education and financial support programs should facilitate training and research to develop appropriate local enterprises. In addition, a stronger entrepreneurial culture in rural Ontario coupled with greater stress on marketing should facilitate the introduction of new enterprises while strengthening existing economic activity.

- There is the potential to develop alternative crops, products and value-added enterprises within the agricultural sector.

- A mix of business and small "clean" industry would further diversify the economy. In the current economic environment, greater success (and less disruption) is more likely to ensue from the development of local enterprises than from attempting to attract large new industry to rural areas.

- Agri-tourism could potentially attract tourist dollars to rural areas and increase the income-generating capacity of the farm (e.g. Abandoned rail lines are being discussed as the basis for a provincial network of recreational trails.)

Although the economic advantages of diversification are evident there is concern among some rural people:

- Some members of the farm population wish to emphasize solutions related to increasing farm profitability rather than increasing alternative uses of the land.

- The influx of urban people into some rural areas has sometimes had a negative impact upon community identity. The integration of rural and urban people has not always occurred, with the two groups often perceived as having conflicting values and vision.

- The environmental impact of non-agricultural development is difficult to assess.

Social Marketing in support of the Rural Countryside: A campaign to raise public awareness of rural natural resources could promote:

- the voluntary conservation and preservation of the rural landscape

- the quality and diversity of Ontario-grown produce

- rural tourism and recreation

Human Resource Development: Capacity-building and leadership development among rural people and organizations is central to the rural development process.

- Locally directed leadership training programs would foster the personal, organizational and community leadership skills of potential leaders.

- Pilot projects involving community-based planning would bring economic, social and environmental interests together within a community to identify local issues, as well as to discover and implement solutions.

Rural Information Networks: Local communities increasingly require access to reliable and up-to-date information to make decisions. New technologies provide the opportunity for long-distance links with databases, other communities, and research and government facilities.

- The "tele-cottage" model would provide computer training and linkage centres across rural areas.

- A rural resource centre would provide a focal point for rural development expertise, research, education and training programs.

A Rural Strategy: A provincial rural strategy would ensure a strong voice for the rural sector by co-ordinating rural programmes and devising ways to make information and support more accessible to farmers. It would potentially address:

- A framework for the long-term protection of the rural environment.

- Mechanisms to ensure that provincial policies and programs are tailored to rural needs.

- A "one-window" approach to service delivery which would co-ordinate programs offered by ministries, agencies and institutions.

RECOMMENDATIONS

It is recommended that:

31. Local decision-making be fostered to ensure that rural communities have a stable, appropriate and diverse economy.

32. Public awareness of the importance of rural communities to the province's economy and ecology be increased.

33. Locally directed leadership training programs be examined, and pilot projects involving community-based planning be instituted.

34. Model rural information networks be examined and developed.

35. A "one-window" approach of service delivery from Government to rural communities be implemented to foster greater accessibility to rural and agricultural support and aid programs.

(Please see the associated recommendations, particularly numbers 7, 8, and 12-18)

(E) CLIMATE CHANGE

Recent discoveries appear to show that the Earth's climate itself is also under stress from human activities. While the scientific debate continues over the ultimate nature, degree and timing of any climate change which may result from human activities, there is a strong scientific consensus on some basics:

- We are releasing several gases into the atmosphere more rapidly than in pre-historic times.

- A number of these gases - methane, nitrous oxide and carbon dioxide - function in a way which holds radiation within the Earth's atmosphere, rather than allowing it to escape into space.

- This phenomena, sometimes termed the "greenhouse effect", is found on Mars and Venus as well, and is central to any explanation of why Earth's climate differs from that of these neighbouring planets.

Most scientists also agree that the increase in these greenhouse gases on Earth will eventually result in a changed climate. The major question is, are we going to have a slowly-building, rather pleasant-sounding "Global Warming"; or are we in for a rapid jump to a situation perhaps best characterized as "Scorched Earth"? In detail, the debate focuses on:

- how much the temperature ultimately will rise;

- the time period over which this rise will manifest itself;

- what, if anything, we can do to stop our excess emissions;

- how we can adapt to those changes that are coming.

TRANSITIONS AND ATTITUDES: There is a great deal of uncertainty in the evidence for climate change, both worldwide and for Ontario. Globally, scientific conferences under the United Nations appear to have reached a consensus that world temperatures are already rising, and are expected to move still higher over the coming decades. Closer to home, the detailed predictions of the climatologists are that areas on more northerly latitudes, and in the centre of continents, will warm the fastest and the furthest. If true, this places Ontario - and its farmers - on the front lines against climate change.

Evidence in Canada and Ontario is essentially piecemeal at present, but there are a number of aspects which are rather worrying. Ontario Hydro has done some long-term temperature and precipitation measurements at a number of sites across the province, and has discovered some notable shifts from historic patterns. The Ministry of Natural Resources and Forestry Canada

track forest fires across the country, and the 1980's were the worst decade on record - supporting evidence for the hotter and drier climate across the North. Quebec Hydro has lost hundreds of millions of dollars in recent years as drought in the North led to lower hydro-electricity generation. Agricultural drought has struck right across North America over the past decade, from California to Saskatchewan to Nova Scotia. Finally, as Canadians, most of us keep a fairly useful running tab on the weather - and many would argue that their own internal thermometers back up the climate change thesis.

Farmers, as much as any other economic sector, are vulnerable to any unexpected changes in the climate. Successful agriculture requires a large element of predictability in its climate. As long as farmers know (approximately): how long the growing season is likely to be; how much and when rain will tend to fall; how hot it will be and for how long; and what kinds of storms are likely; then, they can make plans. If frosts come surprisingly early in the fall, or late in the spring; if there are unseasonably hot, cold, wet or dry spells; or if more big storms arrive than expected; then, the farmer can be left without a crop. With a less stable climate, it is almost impossible to know whether to grow corn or hay or apples or peaches. This sort of instability can add up to: crop losses; demands on the public purse for emergency, insurance and credit assistance; wasted time, energy, inputs and equipment; improper management of soil, water and animal resources; and a reluctance to invest under such uncertain conditions.

Those who suggest that agriculture in Ontario will just happily "head North" miss the extraordinary difficulties and costs of such a move. For example, good soils (fertile, well-drained, relatively flat, etc.) are absent in much of the North; the necessary infrastructure for successful agricultural production is absent as well; there are enormous problems associated with clearing more Northern forests for any purpose; and questions of land ownership, education and training for new farmers, and incentives and/or compensation for existing farmers will not be easy to resolve. We can see, then, that climate change poses a number of real threats to Ontario's agricultural community, and should not be simply glossed over, or left "until all the research is in."

IMPERATIVES: Agriculture will be on the front-line against climate change. Drought, frost, flood and storm losses are real risks, but the simple increased variability and uncertainty of weather can go a long way towards disrupting conventional farm practices. Agriculture thus faces a potential "Climatic Triple Threat", from:

- The costly damages produced by drought, storm, frost, flood and heatwave.
- The costly changes required to reduce agricultural emissions of greenhouse gases.
- The costly changes required to adapt farm practices to a changing climate.

Since there is a myriad of farm practices which could be changed to either reduce green-house gas emissions or to adapt to the changing climate; and since farmers face multiple environmental pressures; and since climate change may well impose a triple cost on many already marginal producers; it is imperative that the first practices to be changed are those which:

- are environmentally-unsustainable for other reasons; and
- are productivity and net profitability-enhancing.

SUSTAINABLE AGRICULTURE - REDUCING GREENHOUSE GAS EMISSIONS: Like any other economic sector, agriculture itself is a significant (albeit unintentional) source of greenhouse gas emissions in Ontario:

- Most importantly, the soil is an enormous storehouse of organic matter, or carbon. Any agricultural practices which reduce this organic content release millions of tonnes of CO2 into the atmosphere.
- Fossil fuel used in farming, as well as food processing/distribution/storage/preparation is a source of CO2.
- Pesticides are often made from petrochemical inputs and substances.
- Fertilizers release nitrous oxide gas into the atmosphere.
- The continuing removal of woodlands may be contributing to a net increase in carbon emissions.

Fortunately, a wide range of sustainable agricultural practices also serve to reduce these emissions:

Soil Management — Since every per cent of organic matter fixes 40 tonnes of CO2 per hectare of land, the soil-building practices associated with sustainable agriculture provide a significant benefit in greenhouse terms.

Manure Management — The incorporation of manure's available nitrogen and organic matter into the soil is a useful step; and the use of composted manure may also serve to reduce the methane and nitrous oxide emissions of raw manure.

Low-Input Practices — Sustainable farming may utilize fewer fossil fuel inputs, as well as fewer synthetic pesticides and fertilizers. This substitution of on-farm renewable resources helps reduce greenhouse emissions.

Agroforestry/Shelterbelts — These sustainable practices serve not only to remove carbon from the atmosphere, but also to ease soil erosion, and to hold water resources on the farm.

Mixed Agriculture — It should be noted that the integration of animals into farming can help support regular crop rotations, including forages, and thus help soil organic matter; can generate the manure essential to much of sustainable agriculture; and can help reduce the need for purchased fuel, fertilizer and pesticide inputs.

SUSTAINABLE AGRICULTURE AND ADAPTATION TO CLIMATE CHANGE: In addition, agriculture will need to shift in a direction that can best flex or adapt to the amount of climate change which appears inevitable:

Cropping Practices - Certain varieties, specific crops, and specialized cropping systems are more dependent on our existing, stable climate, than others. That is, some varieties will only achieve their maximum yield under a very narrow range of climatic conditions; some entire crops require a very specific climatic range (corn, peaches etc.); and any monoculture cropping system places the farmer at an enormous risk during times of uncertain weather. Sustainable agriculture attempts to use hardy varieties that require few inputs; longer crop rotations; and a more mixed, or diversified farming system. This may well be the best path to high average yields and economic returns under conditions of climatic uncertainty.

Water Management - Since changes in the quantity and pattern of precipitation have already been noted in Ontario, better water management programs are essential to managing these climate-related risks. Therefore, it is important to support those farm practices which support high soil organic levels, which utilize cover crops, and which are likely to hold water, on a continuing basis, in the soil. In addition, alterations to existing tile-drainage systems may serve to permit sub-irrigation techniques, by adding water-control dams or valves to existing drainage systems, thus preserving valuable water for when it is most needed.

Fossil Fuel Prices - Agricultural systems which are heavily dependent on fossil fuels are at an additional risk, since public policy to combat climate change is likely to move the price of these fuels higher. That is, carbon taxes (already in existence in parts of Europe) are likely candidates for future implementation in North America as well. Since we have subsidized the use of these inputs, and have taken full advantage of imported produce grown and shipped on the basis of low-cost fuel, we stand in a rather vulnerable, and inflexible situation should climate change increase. Sustainable farming, processing and retailing systems work to get food to the consumer with the least fossil fuel input possible. In addition, the production of renewable fuels from agriculture itself must not be overlooked (e.g. ethanol).

RECOMMENDATIONS

It is recommended that:

36. Our existing system of subsidies, insurance and supports be examined so as to support a shift away from the more high-risk practices outlined above, and discussed earlier in this paper. See especially Recommendation #9.

Most of the more sustainable practices discussed earlier in this paper are useful responses to climate change as well (building the soil, reducing inputs, using more on-farm resources, changing manure and water management practices).

37. These sustainable agricultural practices and programs should be recognized as an integral part of any "climate change" response developed by the public or private sectors.

It is increasingly likely that a full-scale response to climate change will be initiated at the federal and provincial levels over the course of this decade. A likely component of this will be a carbon tax on coal, gas and natural gas, and most of these funds will be "earmarked" for expenditure on climate-related programs and policies.

38. Sustainable agriculture programs should be at the top of the list of priority recipients - both as a sector likely to face real costs as a result of climate change, and as a large potential source of greenhouse gas reductions.

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